(3) Multi-echo + equation driven

(1)

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DOCUMENT-IDENTIFIER: US 5742163 A

TITLE: Magnetic resonance scan calibration and reconstruction technique for multi-shot, multi-echo imaging

DATE-ISSUED: April 21, 1998

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Liu; Haiying	Euclid	OH		
DeMeester; Gordon D.	Wickliffe	OH		
McNally; James M.	Chagrin Falls	OH		

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Picker International, Inc.	Highland Heights	OH			02

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US-CL-ISSUED: 324/309; 324/307
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PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
5151656	September 1992	Maier et al.	324/309
5531223	July 1996	Hatanaka	324/309
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FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	US-CL
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0 280 310	August 1988	EPX	

US 4,788,500
WO 8,701,208
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"Cartesian Echo Planar Hybrid Scanning with Two to Eight Echoes", Kashmar, et al. IEEE Trans on Medical Imaging, V. 10, N. 1, Mar. 1991.
"Interleaved Echo Planar Imaging on a Standard MRI System", Butts, et al. MRM 31:677-72 (1994).
"Ultrafast Interleaved Gradient-Echo-Planar Imaging on a Standard Scanner", McKinnon, MRM 30:609-616 (1993).

ART-UNIT: 225
PRIMARY-EXAMINER: Arana; Louis M.
ATTY-AGENT-FIRM: Fay, Sharpe, Beall, Fagan, Minnich & McKee

ABSTRACT:

A sequence control (40) causes a transmitter (24) and gradient amplifiers (20) to transmit radio frequency excitation and other pulses to induce magnetic resonance in selected dipoles and cause the magnetic resonance to be focused into a series of echoes in each of a plurality of data collection intervals following each excitation. A receiver (38) converts each echo into a data line. Calibration data lines having a close to zero phase-encoding are collected during each of the data collection intervals. The calibration data lines in each data collection interval are zero-filled (86) to generate a complete data set and Fourier transformed (88) into a series of low resolution complex images (90.sub.1, 90.sub.2, . . . 90.sub.n), each corresponding to one of the data collection intervals. The low resolution images are normalized (92) and their complex conjugates taken (94). Imaging data lines are sorted by a data collection interval and zero-filled (104) to create full data sets. The full data set corresponding to each data sampling interval is Fourier transformed into partial image representations (106.sub.1, 106.sub.2, 106.sub.n). Each partial image is multiplied (108) by a complex conjugate of the normalized phase correction map (96) to create corrected partial images which are summed (112) to generate a composite image (114). The composite images are density corrected (120).

20 Claims, 11 Drawing figures

Term	Documents
DRIVEN.USPT.	585378
DRIVENS.USPT.	1
EQUILIBRIUM.USPT.	93769
EQUILIBRIUMS.USPT.	234
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